

What is claimed is:

1. A furrow opener comprising:

a rotatable disc operable to be pulled in a forward direction to thereby open a furrow;
a seed boot fixed relative to one side of the disc and being operable to insert seed in
5 the furrow,
said seed boot presenting an outboard side distally spaced from the disc; and
a fertilizer injector wing fixed to the seed boot and being operable to form a fertilizer
bed and inject fertilizer therein,
said fertilizer injector wing being positioned adjacent said outboard side of the seed
10 boot so that said seed boot is positioned between the disc and wing,
said fertilizer injector wing including an outboard portion positioned below the
outboard side of the seed boot and angling away therefrom.
2. The opener as claimed in claim 1,

15 said seed boot presenting a lower-most margin disposed in the furrow when inserting
seed therein,
said seed boot including a seed tube defining an aft-most seed port through which
seed passes when the seed boot is inserting seed into the furrow,
said seed port presenting an outer-most extremity distally spaced from the disc.
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3. The opener as claimed in claim 2,

25 said fertilizer injector wing including at least one terminal orifice through which
fertilizer passes when the wing is injecting fertilizer into the furrow,
said terminal orifice being spaced below the lower-most margin and laterally spaced
from said outer-most extremity.
4. The opener as claimed in claim 3,

30 said terminal orifice being located along said outboard portion.
5. The opener as claimed in claim 4,

35 said outboard portion presenting a leading edge relative to the forward direction and
a lower-most edge extending from said leading edge,
said terminal orifice being recessed relative to said leading and lower-most edges.

6. The opener as claimed in claim 3; and
a source of gaseous ammoniacal fertilizer;
a delivery system fluidly communicating said source with said terminal orifice,
said delivery system cooperating with said terminal orifice to pressurize the gaseous
5 ammoniacal fertilizer at least below the vapor pressure of the ammoniacal
fertilizer so that the injector wing injects liquid fertilizer into the furrow.

7. The opener as claimed in claim 6,
said ammoniacal fertilizer comprising anhydrous ammonia.

10 8. The opener as claimed in claim 7,
said delivery system being configured to deliver more than thirty pounds of
anhydrous ammonia per acre.

15 9. The opener as claimed in claim 1,
said fertilizer injector wing further including an inline portion engaging said outboard
side of said seed boot.

10. The opener as claimed in claim 9,
20 said inline portion presenting a generally linear axis of orientation,
said axis being generally parallel to vertical.

11. The opener as claimed in claim 10,
said axis being generally parallel to said outboard side of said seed boot.

25 12. The opener as claimed in claim 10,
said outboard portion being generally flat and presenting a generally longitudinal
center axis,
said center axis defining an angle relative to said axis of orientation.

30 13. The opener as claimed in claim 12,
said angle being between about five degrees and thirty degrees.

14. The opener as claimed in claim 13,
said angle being about fifteen degrees.

15. A method of simultaneously applying a toxic charge of ammoniacal fertilizer in close proximity with seed, said method comprising the steps of:

- (a) fixing a seed boot relative to a rotatable disc and positioning the boot on one side thereof;
- 5 (b) fixing a fertilizer injector wing to said seed boot and laterally spacing the wing from the boot so that the seed boot is positioned between said disc and wing;
- (c) pulling the disc through the soil to thereby open an elongated furrow wherein said disc creates a zone of disturbed soil in the furrow;
- 10 (d) pulling the seed boot and injector wing through the furrow to form a seed bed within the disturbed soil zone and to simultaneously form a fertilizer bed in communication with the furrow and spaced to one side of the seed bed so that a berm is formed between the seed and fertilizer beds;
- (e) placing seed along the seed bed; and
- 15 (f) placing ammoniacal fertilizer along the fertilizer bed.

16. The method as claimed in claim 15,
step (d) further including the steps of forming said furrow elongated along a center axis and having a bottom dead center point vertically spaced beneath the center axis so that said disturbed soil zone is generally centered around the center axis and forming said seed bed above the bottom dead center point.

20 17. The method as claimed in claim 15,
steps (c), (d), (e), and (f) being performed generally simultaneously.

25 18. The method as claimed in claim 15,
step (d) including the step of pulling the seed boot and at least a portion of the wing in the shadow of the rotating disc.

30 19. The method as claimed in claim 18,
step (d) further including the step of pulling an additional portion of the wing outside of the shadow of the rotating disc.

20. The method as claimed in claim 15,
said ammoniacal fertilizer comprising anhydrous ammonia.

5 21. The method as claimed in claim 20,
step (f) including the steps of condensing the anhydrous ammonia into a liquid and
applying the liquid to the soil.

10 22. The method as claimed in claim 15,
said berm being at least about one half inch wide and less than about two and one-
half inches wide.

15 23. The method as claimed in claim 15,
step (d) including the steps of pulling a portion of the wing through the disturbed soil
zone and pulling an additional portion of the wing outside of the disturbed
soil zone.

20 24. The method as claimed in claim 15,
step (b) including the steps of fixing the wing to a generally vertical wall of the seed
boot,
said additional portion of the wing being angled relative to said vertical wall.

25. A fertilizer injector wing for use with a furrow opener wherein the furrow opener includes a disc that rotates in a forward direction to open a furrow and a seed boot that forms a seed bed in the furrow and inserts seed therein, said injector wing comprising:

5 an inline portion operable to engage the seed boot and presenting a generally linear axis of orientation,
said axis of orientation being generally parallel to vertical when the inline portion engages the seed boot;

10 an outboard portion positioned below the inline portion and angling away therefrom;
a leading edge at least partially disposed along said outboard portion and being configured to cut a slot in communication with the furrow adjacent the seed bed; and

15 a terminal orifice in a linearly aligned trailing relationship with the leading edge and being configured to inject an ammoniacal fertilizer into the slot,
said terminal orifice being spaced below and laterally spaced from said inline portion.

26. The wing as claimed in claim 25; and
a second terminal orifice in a linearly aligned trailing relationship with the first mentioned terminal orifice and being configured to insert a second fertilizer into the slot.

27. The wing as claimed in claim 26,
said first mentioned terminal orifice defining a first cross-sectional area and said second terminal orifice defining a second cross-sectional area,
25 said first area being substantially smaller than said second area so that ammoniacal fertilizer passing through the first terminal orifice is substantially more pressurized than fertilizer passing through said second terminal orifice.

28. The wing as claimed in claim 25,
30 said terminal orifice being located along said outboard portion.

29. The wing as claimed in claim 28,
said outboard portion presenting a lower-most edge extending from said leading

edge,

said terminal orifice being recessed relative to said leading and lower-most edges.

30. The wing as claimed in claim 25,

5 said terminal orifice being configured to pressurize the ammoniacal fertilizer at least below the vapor pressure of the ammoniacal fertilizer so that the injector wing is operable to inject liquid ammoniacal fertilizer into the slot.

31. The wing as claimed in claim 25,

10 said outboard portion being generally flat and presenting a generally longitudinal center axis,

said center axis defining an angle relative to said axis of orientation.

32. The wing as claimed in claim 31,

15 said angle being between about five degrees and thirty degrees.

33. The wing as claimed in claim 32,

said angle being about fifteen degrees.